

CLAIMS

1. A shelf for use among a plurality of shelves in a rack for use in a telecommunications system for providing both narrowband and broadband services to a plurality of subscriber premises, comprising:

a housing for connection to a narrowband network and for connection to a broadband network for connecting said narrowband network and said broadband network to said plurality of subscriber premises via a corresponding plurality of twisted copper pairs, wherein said housing includes plural sections including:

an upper section (22) for housing in a central portion (24) thereof a plurality of lowpass filter cards with connectors thereon for insertion in a backplane of said housing, and wherein said upper portion (22) of said housing also has end portions (33) reserved for connecting said narrowband network and said plurality of twisted copper pairs; and

a lower section (20) for housing a plurality of line termination cards in a central portion (14) thereof, each with connectors thereon for insertion in said backplane of said housing, and wherein said lower section (20) includes at least one end portion (35) reserved for at least one network termination card for said connection to said broadband network.

2. A housing, for connection to a narrowband network and for connection to a broadband network for connecting said narrowband network and said broadband network to a plurality of subscriber premises via a corresponding plurality of twisted copper pairs, wherein said housing includes plural sections including:

a first section (22) for housing in a central portion (24) thereof a plurality of lowpass filter cards

with connectors thereon for insertion in a backplane of said housing, and wherein said first section (22) of said housing also has end portions (33) reserved for connecting said narrowband network and said plurality of twisted copper pairs; and

a second section (20) for housing a plurality of line termination cards in a central portion (14) thereof, each with connectors thereon for insertion in said backplane of said housing, and wherein said second section (20) includes at least one end portion (35) reserved for at least one network termination card for said connection to said broadband network.

3. A shelf, comprising:

a housing for connection to a narrowband network and for connection to a broadband network for connecting said narrowband network and said broadband network to said plurality of subscriber premises via a corresponding plurality of twisted pairs, wherein said housing includes plural sections including:

a first section (22) for housing in a central portion (24) thereof a plurality of lowpass filter cards with connectors thereon for insertion in a backplane of said housing, and wherein said first section (22) of said housing also has end portions (33) reserved for connecting said narrowband network and said plurality of twisted copper pairs; and

a second section (20) for housing a plurality of line termination cards in a central portion (14) thereof, each with connectors thereon for insertion in said backplane of said housing, and wherein said second section (20) includes at least one end portion (35) reserved for at least one network termination card for connection to said broadband network.

4. The shelf of claim 1, wherein said connection to said broadband network is to an asynchronous transfer mode network.

5 5. The housing of claim 2, wherein said connection to said broadband network is to an asynchronous transfer mode network.

6. The shelf of claim 3, wherein said connection to said broadband network is to an asynchronous transfer mode network.

10 7. The shelf of claim 1, further comprising at least one network element processor (16a, 16b).

8. The housing of claim 2, further comprising at least one network element processor (16a, 16b).

15 9. The shelf of claim 3, further comprising at least one network element processor (16a, 16b).

10. The shelf of claim 1, further comprising an alarm collection unit (18).

11. The housing of claim 2, further comprising an alarm collection unit (18).

20 12. The shelf of claim 3, further comprising an alarm collection unit (18).

13. The shelf of claim 1, wherein said backplane includes a multiplexer bus with control leads (78).

25 14. The housing of claim 2, wherein said backplane includes a multiplexer bus with control leads (78).

15. The shelf of claim 3, wherein said backplane includes a multiplexer bus with control leads (78).

5 16. The shelf of claim 1, wherein said backplane includes a bus with access granted to said line termination cards according to an access mode requested by said line termination card.

10 17. The housing of claim 2, wherein said backplane includes a bus with access granted to said line termination cards according to an access mode requested by said line termination card.

15 18. The shelf of claim 3, wherein said backplane includes a bus with access granted to said line termination cards according to an access mode requested by said line termination card.

20 19. The shelf of claim 1, wherein access to said backplane by said line termination cards is according to a cell aging priority mechanism as well as a quality of service priority mechanism.

25 20. The housing of claim 2, wherein access to said backplane by said line termination cards is according to a cell aging priority mechanism as well as a quality of service priority mechanism.

30 21. The shelf of claim 3, wherein access to said backplane by said line termination cards is according to a cell aging priority mechanism as well as a quality of service priority mechanism.

22. The shelf of claim 1, wherein said plurality of said lowpass filter cards is equal to twelve lowpass

filter cards and wherein said plurality of line termination cards is equal to twelve line termination cards.

5 23. The shelf of claim 22, wherein each lowpass filter card and each line termination card has four channels, and wherein said plurality of twisted copper pairs is equal to forty-eight.

10 24. The housing of claim 2, wherein said plurality of said lowpass filter cards is equal to twelve lowpass filter cards and wherein said plurality of line termination cards is equal to twelve line termination cards.

15 25. The housing of claim 24, wherein each lowpass filter card and each line termination card has four channels, and wherein said plurality of twisted copper pairs is equal to forty-eight.

20 26. The shelf of claim 3, wherein said plurality of said lowpass filter cards is equal to twelve lowpass filter cards and wherein said plurality of line termination cards is equal to twelve line termination cards.

25 27. The shelf of claim 26, wherein each lowpass filter card and each line termination card has four channels, and wherein said plurality of twisted copper pairs is equal to forty-eight.

 28. The shelf of claim 1, wherein said narrowband network provides a plain old telephone service (POTS).

29. The shelf of claim 28, wherein said connection to said broadband network is to an asynchronous transfer mode network.

5 30. The housing of claim 2, wherein said narrowband network is for providing a plain old telephone service (POTS).

31. The housing of claim 31, wherein said connection to said broadband network is to an asynchronous transfer mode network.

10 32. The shelf of claim 3, wherein said narrowband network is for providing a plain old telephone service (POTS).

15 33. The housing of claim 32, wherein said connection to said broadband network is to an asynchronous transfer mode network.

34. The shelf of claim 1 for mounting in a central office rack among a plurality of shelves.

20 35. The shelf of claim 34, wherein said plurality of lowpass filter cards comprises twelve lowpass filter cards, wherein said plurality of line termination cards comprises twelve line termination cards, and wherein four shelves are mountable in said rack.

25 36. The shelf of claim 35, wherein each lowpass filter card and each line termination card has four channels so that said rack serves up to one hundred and ninety-two twisted copper pairs.

37. The housing of claim 2 for mounting in a central office rack among a plurality of shelves.

5 38. The shelf of claim 37, wherein said plurality of lowpass filter cards comprises twelve lowpass filter cards, wherein said plurality of line termination cards comprises twelve line termination cards, and wherein four shelves are mountable in said rack.

10 39. The shelf of claim 38, wherein each lowpass filter card and each line termination card has four channels so that said rack serves up to one hundred and ninety-two twisted copper pairs.

40. The shelf of claim 3 for mounting in a central office rack among a plurality of shelves.

15 41. The shelf of claim 40, wherein said plurality of lowpass filter cards comprises twelve lowpass filter cards, wherein said plurality of line termination cards comprises twelve line termination cards, and wherein four shelves are mountable in said rack.

20 42. The shelf of claim 41, wherein each lowpass filter card and each line termination card has four channels so that said rack serves up to one hundred and ninety-two twisted copper pairs.

25 43. The shelf of claim 1, mountable in a central office rack capable of mounting four shelves, each shelf serving up to forty-eight twisted copper pairs for a total of one hundred and ninety-two twisted copper pairs servable by said rack.

44. The shelf of claim 43, wherein up to three adjacent racks can be interconnected in order to support up to five hundred and seventy-six twisted copper pairs.

5 45. The housing of claim 2, mountable in a central office rack capable of mounting four shelves, each shelf serving up to forty-eight twisted copper pairs for a total of one hundred and ninety-two twisted copper pairs servable by said rack.

10 46. The shelf of claim 45, wherein up to three adjacent racks can be interconnected in order to support up to five hundred and seventy-six twisted copper pairs.

15 47. The shelf of claim 3, mountable in a central office rack capable of mounting four shelves, each shelf serving up to forty-eight twisted copper pairs for a total of one hundred and ninety-two twisted copper pairs servable by said rack.

48. The shelf of claim 47, wherein up to three adjacent racks can be interconnected in order to support up to five hundred and seventy-six twisted copper pairs.

20 49. The shelf of claim 1, wherein said plurality of line termination cards are connected to said at least one network termination card by means of said backplane.

25 50. The shelf of claim 49, wherein each of said twisted copper pairs is connected to a corresponding lowpass filter on one of the plurality of lowpass filter cards and to a corresponding highpass filter on one of the plurality of line termination cards.

51. The housing of claim 2, wherein said plurality of line termination cards are connected to said at least one network termination card by means of said backplane.

5 52. The housing of claim 51, wherein each of said twisted copper pairs is connected to a corresponding lowpass filter on one of the plurality of lowpass filter cards and to a corresponding highpass filter on one of the plurality of line termination cards.

10 53. The shelf of claim 3, wherein said plurality of line termination cards are connected to said at least one network termination card by means of said backplane.

15 54. The shelf of claim 53, wherein each of said twisted copper pairs is connected to a corresponding lowpass filter on one of the plurality of lowpass filter cards and to a corresponding highpass filter on one of the plurality of line termination cards.

20 55. The shelf of claim 1, wherein each of said twisted copper pairs terminates at a node (66) that forms a means for frequency division multiplexing said narrowband and broadband services.

25 56. The shelf of claim 55, wherein said node is connected to a corresponding one of said lowpass filters and a corresponding one of said line termination cards and, in particular, to a highpass filter part of said line termination card.

57. The housing of claim 2, wherein each of said twisted copper pairs terminates at a node (66) that forms a means for frequency division multiplexing said narrowband and broadband services.

58. The housing of claim 57, wherein said node is connected to a corresponding one of said lowpass filters and a corresponding one of said line termination cards and, in particular, to a highpass filter part of said line termination card.

59. The shelf of claim 3, wherein each of said twisted copper pairs terminates at a node (66) that forms a means for frequency division multiplexing said narrowband and broadband services.

60. The shelf of claim 59, wherein said node is connected to a corresponding one of said lowpass filters and a corresponding one of said line termination cards and, in particular, to a highpass filter part of said line termination card.

61. The shelf of claim 50, wherein said frequency division multiplexing node joins a plain old telephone service signal occupying baseband at 0-4 KHz and a data signal allocated bandwidth greater than 4 KHz.

62. The shelf of claim 61, wherein said bandwidth allocation for data is asymmetrically allocated between spectrum used for upstream data as opposed for spectrum used for downstream data, with spectrum used for downstream data predominating.

63. The housing of claim 2, wherein said frequency division multiplexing node joins a plain old telephone service signal occupying baseband at 0-4 KHz and a data signal allocated bandwidth greater than 4 KHz.

64. The housing of claim 63, wherein said bandwidth allocation for data is asymmetrically allocated between

spectrum used for upstream data as opposed for spectrum used for downstream data, with spectrum used for downstream data predominating.

5 65. The shelf of claim 3, wherein said frequency division multiplexing node joins a plain old telephone service signal occupying baseband at 0-4 KHz and a data signal allocated bandwidth greater than 4 KHz.

10 66. The shelf of claim 65, wherein said bandwidth allocation for data is asymmetrically allocated between spectrum used for upstream data as opposed for spectrum used for downstream data, with spectrum used for downstream data predominating.

15 67. The shelf of claim 7, wherein said network element processor is used for terminating and processing switched virtual circuit signaling channels.

20 68. The shelf of claim 67, further comprising an alarm collection unit (18), and wherein said network element processor is used for providing an ethernet termination for an alarm collection unit ethernet port.

25 69. The housing of claim 8, wherein said network element processor is used for terminating and processing switched virtual circuit signaling channels.

30 70. The housing of claim 69, further comprising an alarm collection unit (18), and wherein said network element processor is used for providing an ethernet termination for an alarm collection unit ethernet port.

71. The shelf of claim 9, wherein said network element processor is used for terminating and processing switched virtual circuit signaling channels.

5 72. The shelf of claim 71, further comprising an alarm collection unit (18), and wherein said network element processor is used for providing an ethernet termination for an alarm collection unit ethernet port.

73. The shelf of claim 1, used as a hub shelf with one or more remote shelves connected thereto.

10 74. The housing of claim 2, used as a remote housing used as a hub shelf with one or more remote shelves connected thereto.

75. The shelf of claim 3, used as a hub shelf with one or more remote shelves connected thereto.

15 76. The shelf of claim 73, wherein said one or more remote shelves are connected to said shelf by means of an aggregate line termination card corresponding to a transport mechanism used to interconnect said shelf used as a hub with said remote shelf, and wherein a function of said corresponding lowpass filter is carried out at
20 said remote shelf.

25 77. The housing of claim 74, wherein said one or more remote shelves are connected to said shelf by means of an aggregate line termination card corresponding to a transport mechanism used to interconnect said shelf used as a hub with said remote shelf, and wherein a function of said corresponding lowpass filter is carried out at said remote shelf.

5 78. The shelf of claim 75, wherein said one or more remote shelves are connected to said shelf by means of an aggregate line termination card corresponding to a transport mechanism used to interconnect said shelf used as a hub with said remote shelf, and wherein a function of said corresponding lowpass filter is carried out at said remote shelf.

10 79. The shelf of claim 73, wherein each said remote shelf is connected to said shelf used as a hub redundantly.

15 80. The housing of claim 74, wherein each said remote shelf is connected to said shelf used as a hub redundantly.

81. The shelf of claim 75, wherein each said remote shelf is connected to said shelf used as a hub redundantly.

20 82. The shelf of claim 79, wherein said remote shelves are connected to said hub redundantly by means of connections to two separate shelves and wherein said hub comprises a rack of shelves.

83. The housing of claim 80, wherein said remote shelves are connected to said hub redundantly by means of connections to two separate shelves and wherein said hub comprises a rack of shelves.

25 84. The shelf of claim 81, wherein said remote shelves are connected to said hub redundantly by means of connections to two separate shelves and wherein said hub comprises a rack of shelves.

85. The shelf of claim 73, wherein said shelf accommodates line termination cards for direct connection to subscriber premises and aggregate line termination cards for connection to remote shelves, wherein service classes in both cases are provided for subscribers by separate buffers per service class, each contending for upstream access to said backplane, wherein the service class buffers for aggregate line termination cards have a cell priority equal to a sum of the aggregate cell priorities in each buffer or some percentage thereof, in order that subscriber premises connected to said remote shelves are assigned a fair share of an operating bandwidth of the hub.

86. The housing of claim 74, wherein said shelf accommodates line termination cards for direct connection to subscriber premises and aggregate line termination cards for connection to remote shelves, wherein service classes in both cases are provided for subscribers by separate buffers per service class, each contending for upstream access to said backplane, wherein the service class buffers for aggregate line termination cards have a cell priority equal to a sum of the aggregate cell priorities in each buffer or some percentage thereof, in order that subscriber premises connected to said remote shelves are assigned a fair share of an operating bandwidth of the hub.

87. The shelf of claim 75, wherein said shelf accommodates line termination cards for direct connection to subscriber premises and aggregate line termination cards for connection to remote shelves, wherein service classes in both cases are provided for subscribers by separate buffers per service class, each contending for upstream access to said backplane, wherein the service

class buffers for aggregate line termination cards have a cell priority equal to a sum of the aggregate cell priorities in each buffer or some percentage thereof, in order that subscriber premises connected to said remote shelves are assigned a fair share of an operating bandwidth of the hub.

88. The shelf of claim 1, wherein said plurality of lowpass filter cards are housed at least in part in a separate splitter shelf for use in cases where separate service providers are responsible for said narrowband and broadband services, or for a digital loop carrier configuration.

89. The housing of claim 2, wherein said plurality of lowpass filter cards are housed at least in part in a separate splitter shelf for use in cases where separate service providers are responsible for said narrowband and broadband services, or for a digital loop carrier configuration.

90. The shelf of claim 3, wherein said plurality of lowpass filter cards are housed at least in part in a separate splitter shelf for use in cases where separate service providers are responsible for said narrowband and broadband services, or for a digital loop carrier configuration.

91. A shelf for use among a plurality of shelves in a rack for use in a telecommunications system for providing both narrowband and broadband services to a plurality of subscriber premises, comprising:

a housing for connection to a narrowband network and for connection to a broadband network for connecting said narrowband network and said broadband

network to said plurality of subscriber premises via a corresponding plurality of twisted copper pairs, wherein said housing includes plural sections including:

5 an upper section (22) for housing in a central portion (24) thereof a plurality of lowpass filter cards with connectors thereon for insertion in a backplane of said housing, and wherein said upper portion (22) of said housing also has end portions (33) reserved for connecting said narrowband network and said plurality
10 of twisted copper pairs; and

15 a lower section (20) for housing a plurality of line termination cards in a central portion (14) thereof, each with connectors thereon for insertion in said backplane of said housing, and wherein said lower section (20) includes at least one end portion (35) reserved for at least one network termination card for cable connection to said broadband network.